


30 September 1982 Vol 1 No 24

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## How good is the NewBrain?

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**Learn machine code**

**BBC screen lines**

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**Accuracy**
*Popular Computing Weekly* cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work.

# This Week

Cover illustration by [illegible]



# Editorial

Adventure games have a small but devoted following among microcomputer users.

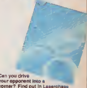
Go to any micro exhibition and you will find a few intent individuals, oblivious to the noise of the surrounding *Space Invader* stalls earnestly discussing the merits of their latest Adventure Not for them the tests of co-ordination and reflex demanded by *Asteroids* and *Defender* They are living in another world literally

Adventure games are a curious mix of puzzle and fantasy The protagonist finds him, or her, self in a world that can range from Tolkien's *Lord of the Rings* to Clarke's *2001 A Space Odyssey* The object of the game is usually to find some hidden treasure or rescue an imperilled princess

It is essentially a battle of wits — the player versus the author of the program. But, though adventure writers can be pretty devious, the clues to solving the game are usually there, if you look hard enough

There is a feeling of tremendous satisfaction in solving an Adventure or even part of one It is a feeling that is deserved, since your success depends on your native wit or your ability to cheat by looking through the program listing

# Next Week



**Can you drive your opponent into a corner? Find out in Laserchase — a new game for ZX Spectrum**

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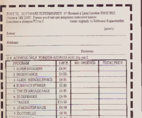
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# Sinclair hopes to clear backlog

SINCLAIR Research remains confident that it will clear its Spectrum order backlog by the middle of October This claim is made despite still lengthening delivery times

Only about 25,000 of the 40,000 orders for the new machine have so far been fulfilled Many customers for the 48K version have now waited longer than the 12 week delivery promised by Clive Sinclair in August

A spokesman for Sinclair Research explained that most problems concern the 48K and that delivery of the 16K is now down to 10 weeks

Graham Tillman at Jaeserv Sinclair's mail order company in Camberley, admitted the difficulties "We were getting a 50 percent rejection rate for the 48K machines at quality control" he said

"Design of the Ram expansion board caused problems It has very fine tracks prone to breaking and shorting "

When the Spectrum printed-circuit board was redesigned by Timex in Portugal to correct initial design problems the opportunity was taken to incorporate the Ram expansion circuit into the main board The Ram expansion now has 12 Ram chips which plug individually into sockets on the main board

Stewart Crooksbank Production Manager of Timex Dundee says "Production is increased with the new boards and we seem to have sorted out the problems Some of the old boards are still going out (as 16K machines) but there will be no problems with upgrading"

Graham Tillman confirms that the first sizeable delivery of new 48K machines has been received at Camberley He says "We are confident of delivering a reasonable number of 48K models each week "

## Software by cable tv

A CABLE television network, that will enable tv owners to access a vast database of software, could be in operation by 1985

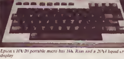
Such a system of software distribution was proposed by Kenneth Baker, the Information Technology Minister speaking at the Edinburgh Festival tv conference He said that a 30-channel system could be installed in half the country's homes in time for the introduction of direct satellite broadcasting early in 1986

Decisions on the future of cable tv will be taken this autumn based on the recommendations of the Hunt Inquiry — due to produce its report by the end of September If cable tv gets the go-ahead the first networks could be licenced in 1983 The estimated £2½bn cost of the cable tv network would be raised through private enterprise

## More programs for NewBrain

GRUNDY Business systems has launched a range of software to support its NewBrain micro

French and German teaching and card index packages cost £4 95 A home finance package and three games — *Tycoon Quadrax* and *Space Battle* all cost £9 95 A range of business programs including a mailing list package and a monthly accounts package cost £25 95



*Epson s HX 20 portable micro has 16K Ram and a 20X4 liquid crystal display*

# Epson (UK) to launch HX20 in November

EPSON (UK) launch a new portable microcomputer the HX-20 in mid-November

A compact unit weighing just over 3½lbs, it incorporates a true full size keyboard, 16K Ram, dot programmable 20 character × 4 line liquid crystal display (lcd) 24 column dot matrix printer microcassette drive and 50h Ni-Cad battery power supply An adaptor allows mains operation

The HX-20 runs the full range of Microsoft Basic commands and when connected to an external monitor will display colour Memory space is divided into 5 partitions (with a sixth for assembler programs) accessed using a Login command The lcd display can be used to view any portion of a virtual screen of up to 255 character width The cassette drive is controlled from the keyboard using the Wind command

The HX-20 has both RS232C and serial interfaces, the cassette drive unclips and can be replaced by a plug-in Rom cartridge An expansion box can be attached to the left hand side giving an additional 16K Ram and 16K Rom There is also an 8K Rom slot underneath the machine for assembler programs

Launch of the HX-20 will be at the Compek UK show on November 16 to 19 A desk top version is being planned to feature a built in monitor and 5¼ inch disc drives

Dan Dielhenn, Epson's Sales Manager said The HX 20 should go like a rocket It marks the beginning by Epson of a long-term commitment to the manufacture of microcomputers Complete with printer micro-cassette drive and mains adaptor the HX-20 costs £479 plus VAT The expansion box costs £80 plus VAT

## Sinclair boosts school micros

MICROCOMPUTING in primary education is given a £15m boost in a scheme announced by Sinclair Research

Under the offer schools taking advantage of the government's Micros in Primaries grants to buy a ZX Spectrum microcomputer will receive additional help from Sinclair

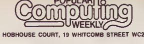
Each of the country's 27 000 primary schools that chooses the Spectrum under the government scheme will also get a free ZX printer Logo educational language and ten discount vouchers Vouchers worth a £45 discount or printer may be used with further Spectrum purchases — one voucher per machine

Clive Sinclair said Giving one computer to a school is a marvellous initiative One computer per child is better than one per class, and our scheme will encourage a move in this direction '

## Competition winner



BRAIN OF BRITAIN When Phillip Brain winner of *Popular Computing Weekly's* Programming Award Scheme gets his Spectrum prize it will be the first micro he has owned He borrowed from a friend the ZX81 on which he developed his winning entry Odyssey Phillip is 21 and since leaving school had until recently been unemployed He is now a member of one of Sheffield's thriving rock bands He said 'It was the first machine-code program I wrote It was a friend who insisted that I enter it in the competition




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# Letters

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## Screen$—null string

When my ZX Spectrum finally arrived I busied myself with trying to understand the wealth of commands (to a former ZX80 user) and not least how to get them out of the keyboard In the end I reached the display file which is arranged so horribly that the manual advises anyone to use *Print at* in place of *Poke* and *Screen$* in place of *Peek*

In fact, the manual is very reticent about how *Screen$* works — you have to search through Appendix C The reason becomes clear when you start using it — although *Screen$* will return the character at the specified line and column when its code lies between 32 and 127, it returns a null string for all graphics characters, including any user-defined graphics

Now this seems to me to be rather a serious drawback in the command, surely it is in precisely the sort of situation that one would use user-defined graphics that one would need some way of checking the display — take any Invaders type program, for instance?

On discovering this, my initial reaction (after fury, disbelief, muttered curses) was to get round the problem using *Over*

If *Screen$* returned a null string, the routine would print the graphics characters one by one over the relevant position and then use *Screen$* to check if the result was a space, in which case it was the correct character

This however, had two snags It was fairly slow (up to a second or so), and it looked a little bit messy on the screen during execution This later effort is much better·

```
100 LET I=CODE SCREEN$ (Y X)
    IF I THEN RETURN
110 POKE 23606 PEEK 23675
    POKE 23607 PEEK 23676-1
120 LET I=CODE SCREEN$
    (Y X)+112
130 POKE 23606 0 POKE 23607 60
    RETURN
```

Before calling the subroutine you must define Y and X the column and line positions of the spot you are checking It works by temporarily making the Spectrum think the character set starts where the user-defined graphics are located

The disadvantage is that this does not recognise the predefined graphics codes 129-142 returning I=112 for all of them However, these are such miserable graphics anyway included more for ZX81 compatibility than for any innate value I should think that this is not much of a handicap

Hope this is helpful My thanks to Sam Goodwin (*Popular Computing Weekly*, August 5) for the first article I've seen to tell Spectrum owners something they couldn't have read in the manual

*Dominic Ferard*
*Sunningdale House*
*Raby Road*
*Stockton-on-Tees*
*Cleveland*

## Reviews unfair to Vic20

Why are your Vic20 program reviews almost always bad? The worst yet must surely be on the *Vicpendium 1* by OPUS 2 software I have had this cassette for three weeks and find it very enjoyable *Gorgon's Tomb* plays well, even if it is based on a maze Their *Othello* is not easily beaten — as they say, you have to keep your wits about you, for it plays a subversive game and will suddenly turn the tables on you *Digitman* does not seem to do anything wrong, the error trapping seems quite good to me

But it is the *Invaders* comment where you really show yourselves up It is certainly not slow, especially at the end, and the 'oval blobs' you mention are very obviously not oval blobs at all but well defined 'alien' characters

Come on, *Popular Computing Weekly* ZX's are not the only programs nor the only computers in the world What about admitting you might be wrong, for once?

*P E Bagley*
*33 Caldbeck*
*Waltham Abbey*
*Essex EN9 1UR*

**We have never claimed to be infallible. We do make some mistakes, though we make every effort to avoid them**

**However, software reviews depend largely on the taste of the reviewer What appeals to one reviewer may repel another and vice versa Boris Allan, who reviewed *Vicpendium 1*, was not impressed and felt it was heavily over-priced**

**But, I am glad to report that T P Watts of Opus 2 Software has dropped the price of *Vicpendium 1* by £1 from £7.95 to £6.95 The *Invaders* program, which was written in Basic as the version we reviewed, has subsequently been rewritten in machine code**

**Mr Watts also felt that we had been unfair in our review of *Vicpendium 1*. Perhaps other readers would like to add their comments?**

## Spectrum bug found

Re Ian Logan's "Spectrum bugs wanted" Try this either *Cls Print Chr$* 8, "8" or *Print* at 0,0, *Chr$* 8 "8" will print a graphics shift-8 blob midway down the right side of the screen, and overwrite part of a program (one byte)

*Dilwyn Jones*
*Fodol Farm*
*Hafod Lane*
*Caernarfon Road*
*Bangor*
*Gwynedd*
*North Wales LL57 4BU*

## What's your number?

Like Bill Longley (*Popular Computing Weekly*, August 19) I too attempted to convert David Lawrence's excellent renumbering program to run on the Spectrum, though without the same degree of sophistication as Mr Longley's version

However, there were one or two points I came across which may be of interest to Messrs Lawrence and Longley, and other readers as well

Firstly I found I had to cope with a *Restore* statement To do this I changed line 9967 to

```
IF PEEK I=229 OR PEEK I=236 OR
PEEK I=237 THEN GOSUB 9971
```

Secondly, I was not too happy about *Let* X1=23755 in lines 9960 and 9977 I felt perhaps mistakenly, that this might lead to problems when we all have Microdrives I went to the system variables where I found (manual page 174) *Prog* at byte 23635 I therefore *Let* X1=*Peek* 23635+256**Peek* 23636

Lastly, if you add a Beep statement in lines 9973 and 9980, you can change channels while this program is running and watch the box

```
9973 BEEP 3,3 STOP
9980 IF LINE =9968 THEN BEEP 3,3
     STOP
```

*A J Clavier*
*10 Carnarvon Road*
*Barnet*
*Hertfordshire EN5 4LU*

## No more requests—please

Since the appearance of your interview with me, *Popular Computing Weekly*, July 1, I have been swamped by requests for information about the Sinclair Amateur Radio User Group So much so that I regret I am forced to cease my activities in this direction as soon as I conveniently can This is brought about by several factors

First — the totally excessive demand for information

Secondly — the inability of most members to grasp the main reason for our existence as a group Viz the Sharing of experience, information programs and ideas in our chosen field of activity Everybody wants but very few give

Thirdly — as you know I formed the group as a voluntary, non-profit unit and continue to operate it as such The burden of doing so and trying to give "value for money", especially in view of the sparcity of members input, is more than I am prepared to take

I wonder therefore if you would be kind enough to publish a notice to the effect that no further enquiries can be dealt with in respect of SARUG I would appreciate your assistance

Congratulations on the continued improvement in *Popular Computing Weekly's* quality

*Paul Newman*
*3 Red House Lane*
*Laiston*
*Suffolk IP16 4JZ*

**Paul Newman has been inundated with enquiries since our interview with him was published on July 1. He has asked us to inform our readers that he cannot cope with the massive response generated by the interview and would be grateful if people stopped trying to contact him.**




# Tunnel

**A new game for 16K ZX81 by Brian Hubbard**

In this fast moving program you are at the head of a team of four space craft exploring one of two tunnels on an alien planet. You have to guide them through without hitting the sides of the tunnel.

Each of the four space craft are fitted with automatic lasers that will destroy any rocks directly in front of each ship but the lasers use 10 times more fuel than the propulsion system. If you hit too many rocks your team will run out of fuel and be killed.

You have two controls: up and down which are the keys 6 and 7. The other three space craft in your team automatically follow every move you make.

You start with 2000 units of fuel — the amount left is continuously displayed. A successful mission through the tunnel without hitting anything at all takes 1000 units of fuel so you have 1000 units spare for the lasers.

When run, the program will give you instructions and ask you to choose which tunnel you wish to take. The computer will then go into fast mode and the basic program will store a random tunnel in the memory. You will see your team of space craft on the left hand side of the screen with the tunnel entrance moving across the screen from right to left. Your team will be at the correct height for the tunnel entrance. The whole screen, including the 22nd and 23rd lines, will be taken up by black rock with a white tunnel running through it.

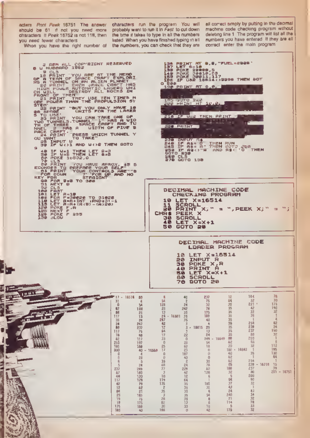
At the end of the game you will be told whether or not it was a successful mission. You will then be asked whether you want to go through a new tunnel, in which case the program will re-run, or whether you want to go through the same tunnel again.

Line 1 holds the machine code program
Lines 18 to 24 give the instructions
Lines 26 to 70 set the width of the tunnel
Lines 80 to 92 give you further instructions
Lines 100 to 130 set up a list of 1800 numbers between 0 and 20 which is used by the machine code program to form the tunnel. The numbers refer to the distance of the tunnel from the top of the screen
Line 125 pokes stop code for machine code to recognise the end of the tunnel
Line 130 prints your starting fuel level. This can be changed provided you keep to a four figure number printed at the same position
Lines 137 to 150 set up variables for use by the machine code
Line 165 starts the machine code program and decides whether you ran out of fuel or reached the end of the tunnel
Lines 180 to 218 are comments on your performance
Lines 220 to 270 re-run the program or run the same tunnel again

Basic variables:
W — input which tunnel you want to take
O — width of tunnel, can be changed for any width
A — distance of tunnel from top of screen
F — addresses where random numbers for the tunnel are stored
S — height of space craft at the start of the program. Notice that S = A at the start of the program so that the tunnel entrance and the team of space craft are all the same height to start the game
A£ — input whether you want to re-run the same tunnel or try a different one

## Entering the program

First put in the machine code program. To do this type in the short decimal machine code loader program. Next type line 1 rem followed by 237 X characters. It is important that the correct number of characters is used or the computer may crash. To check you have the right number of char-



acters *Print Peek* 16751 The answer should be 61 if not you need more characters If *Peek* 16752 is not 118, then you need fewer characters

When you have the right number of characters run the program You will probably want to run it in *Fast* to cut down the time it takes to type in all the numbers listed When you have finished typing in all the numbers, you can check that they are all correct simply by putting in the decimal machine code checking program without deleting line 1 The program will list all the numbers you have entered If they are all correct enter the main program

```
   2 REM ALL COPYRIGHT RESERVED
 B W HUBBARD 1982
   9 CLS
  10 PRINT "YOU ARE AT THE HEAD
OF A TEAM OF SPACE CRAFT EXPLORI
NG A TUNNEL ON AN ALIEN PLANET"
  20 PRINT "EACH SPACE CRAFT HAS
 HIGH POWER AUTOMATIC LASERS WHI
CH WILL    DESTROY ALL ROCKS IN
FRONT OF THEM"
  21 PRINT "THEY USE TEN TIMES M
ORE POWER THAN THE PROPULSION SY
STEM"
  22 PRINT "BUT YOU ONLY HAVE 10
00 SPACE     UNITS FOR THE LASER
S TO USE"
  23 PRINT "YOU CAN TAKE ONE OF
TWO TUNNELS.TUNNEL "1" HAS A WID
TH OF THREE    SPACE CRAFT AND TU
NNEL "2" HAS A   WIDTH OF FIVE S
PACE CRAFT."
  24 PRINT "PRESS WHICH TUNNEL Y
OU WANT       TO TAKE"
  25 INPUT W
  30 IF W<>1 AND W<>2 THEN GOTO
9
  40 IF W=1 THEN LET B=3
  50 IF W=2 THEN LET B=5
  60 POKE 16532,0
  70 CLS
  80 PRINT "YOU HAVE APROX. 45 S
ECONDES TO PREPARE YOUR SELF"
  81 PRINT "YOUR CONTROLS ARE""8
" FOR DOWN      "7" FOR UP AND NO
KEY FOR           STRAIGHT"
  90 FOR B=0 TO 300
  91 NEXT B
  92 CLS
 100 FAST
 101 LET A=10
 102 FOR F=30020 TO 31020
 110 LET A=A+INT (RND*3)-1
 115 LET A=A+(A<8)-(A>20)
 120 POKE F,A
 125 NEXT F
 126 POKE F,255
 130 SLOW
 136 PRINT AT 0,0,"FUEL=2000"
 137 LET G=10
 138 POKE 20000,5
 140 POKE 30010,65
 150 POKE 30011,117
 185 IF USR 16514<>9996 THEN GOT
O 200
 190 PRINT AT 6,0,
 195 GOTO 230
 200 PRINT AT 10,0,
 210 IF W=2 THEN PRINT
 220 PRINT
 230 INPUT A$
 240 IF A$="O" THEN RUN
 245 IF A$="A" THEN GOTO 250
 250 IF A$<>"A" AND A$<>"O" THEN
GOTO 230
 260 CLS
 270 GOTO 130
```

```
DECIMAL MACHINE CODE
  CHECKING PROGRAM
 10 LET X=16514
 11 SCROLL
 20 PRINT X;" = ",PEEK X;" = ";
CHR$ PEEK X
 30 SCROLL
 40 LET X=X+1
 50 GOTO 20
```

```
DECIMAL MACHINE CODE
   LOADER PROGRAM
 10 LET X=16514
 20 INPUT R
 30 POKE X,R
 40 PRINT R
 50 LET X=X+1
 60 SCROLL
 70 GOTO 20
```

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 17 - 16514 | 80 | 6 | 40 | 237 | 12 | 104 | 76 |
| 31 | 6 | 54 | 2 | 75 | 64 | 32 | 70 |
| 0 | 54 | 128 | 24 | 32 | 35 | 221 | 175 |
| 62 | 188 | 25 | 242 | 78 | 35 | 42 | 190 |
| 88 | 25 | 13 | 35 | 175 | 35 | 32 | 32 |
| 117 | 13 | 24 - 16581 | 35 | 185 | 35 | 78 | 1 |
| 35 | 24 | 247 | 35 | 40 | 35 | 1 | 4 |
| 34 | 247 | 42 | 3 | 4 | 35 | 254 | 62 |
| 88 | 232 | 12 | 3 - 16615 | 25 | 35 | 238 | 24 |
| 112 | 75 | 64 | 3 | 13 | 35 | 237 | 190 |
| 78 | 48 | 17 | 22 | 24 | 35 | 88 | 32 |
| 62 | 117 | 33 | 0 | 249 - 16649 | 88 | 203 | 1 |
| 255 | 197 | 0 | 28 | 54 | 62 | 93 | 5 |
| 185 | 188 | 25 | 62 | 18 | 20 | 32 | 112 |
| 200 | 40 - 16559 | 17 | 23 | 0 | 188 - 16683 | 1 | 195 |
| 0 | 4 | 0 | 187 | 0 | 40 | 35 | 130 |
| 0 | 26 | 0 | 40 | 0 | 62 | 1 | 64 |
| 6 | 5 | 35 | 2 | 35 | 62 | 254 | 1 |
| 5 | 24 | 68 | 24 | 78 | 28 | 239 - 16718 | 15 |
| 237 | 249 | 77 | 228 | 62 | 188 | 237 | 39 |
| 67 | 193 | 3 | 42 | 128 | 32 | 80 | 201 - 16751 |
| 48 | 120 | 10 | 12 | 6 | 5 | 203 | |
| 117 | 129 | 119 | 64 | 1 | 54 | 90 | |
| 42 | 79 | 175 | 35 | 185 | 37 | 32 | |
| 12 | 62 | 2 | 35 | 32 | 43 | 1 | |
| 84 | 21 | 35 | 35 | 6 | 24 | 43 | |
| 25 | 185 | 3 | 35 | 54 | 240 | 34 | |
| 19 | 76 | 28 | 35 | 8 | 21 | 32 | |
| 19 | 175 | 82 | 12 | 6 | 114 | 78 | |
| 175 | 188 | 20 | 33 | 18 | 5 | 33 | |
| 185 | 40 | 186 | 0 | 42 | 175 | 32 | |

# Lynx: putting the cat among the pigeons

***David Kelly** talks to John Shirreff and Davis Jansons, co-designers of the Lynx.*

The Lynx is a new low-cost micro from a Cambridge based company Camputers As is the custom for British micros these days it has two designers

John Shirreff and Davis Jansons responsible for the hardware and software respectively make an unlikely team All they have in common is their Cambridge education, a sense of humour, and the Lynx

John is substantially the elder of the two He originally studied architecture but admits to being something of an ageing hippy — a much travelled soft-spoken character who likes the Cambridge environment He worked for GW Design Services a sister company of Camputers, before designing the Lynx While at GW he worked on a project to develop a Z80-based business micro

Davis is an intense 23-year-old with a quick grin He studied mathematics at college and began Z80 programming as a part-time enthusiasm He is a confirmed vegetarian who joined GW in the spring of this year

Dick Greenwood, a director of GW Services first had the idea of making a low-cost micro in March 1982 The company conducted a public opinion survey to find out where most micros fell down and how they could make a better one From the poll it was decided that the Lynx should have at least 16K working Ram colour, hi-resolution graphics Basic a full-size keyboard and potential for expansion

With this brief John and Davis began work on the Lynx in May this year

John explained how he went about the design of the hardware "There are pros and cons to being a hardware person I get the lead fumes from the solder Davis gets to sit in front of a VDU all day

At first I sat in the garden and thought about the possibilities Then I did a timing diagram to see if it would work The whole design philosophy was linked to expandability — particularly now that memory is becoming so cheap

"The main difficulty with the design was its memory banking arrangement. I think we have developed a convenient and unconventional system which has many speed and software advantages The expanded Lynx has 64K of video space and 64K of work space with 24K of Rom The machine has been designed to switch memory in 64K blocks — larger units than most micros

There are problems switching 64K units on the Z80A — you end up switching

John Shirreff — originally studied architecture

the section you are executing But, there are new ways round these problems Because of its memory banking the Lynx can run CP/M® Most low-cost micros will not run CP/M® because the Rom gets in the way

"This sets the Lynx apart from other micros making it much more flexible You can keep hanging on extra 64K blocks of memory indefinitely

If the Lynx is used as a graphics terminal for a main-frame — for which it is well suited — you can dump a screen full of information into the work space manipulate it and put it back. The Z80 is a very good processor with a long future particularly for bit manipulation The snag is that it doesn't have a fixed access-time but the Lynx gets round this

"The expanded version has a bit-mapped hi-resolution display of 512 x 248 Each dot is accessible and colour programmable, with 16K per colour giving the 48K of video memory This makes the display flexible You could even add on a parallel video bank to give a grey-scale.

"Once I thought it through the actual design only took about three weeks The first prototype was completed in early July and we now have the finished product, ready for launch in late October I suppose it has all gone quite smoothly At least it does pretty much what I said it would.

Davis explains the software "We wrote an entirely new Basic version for the Lynx. Most of it was written by me but the screen display driver was written by two other people — Shane Voss and Fiona Miller

"When I started I worked out I had 10 weeks to complete it — six weeks to write



Davis Jansons software designer

it and four weeks to de-bug it, tidy it up and make it consistent throughout " Both John and I have been working more than your standard 40-hour week — but never more than 90!"

Lynx Basic has been designed so that it is easy to modify All the functions commands keywords and syntax checking are in tables held in Rom, but their pointers are kept in Ram If you do not like one of the commands or you want it to be more powerful you can alter it

Other features of the Basic are its optional single-keyword entry You can type all the commands in full Alternatively you can use one key together with the *Escape* key For example *Escape* G gives *Goto*, *Escape* U gives *Until* and so on

"The *Goto Label* function seeks out a labelled line, without looking at the line numbers which simplifies programming The Code function allows machine-code to be entered easily

"The statement is directly followed by the hex arguments and is ignored by the Basic program The machine-code is then executed by *Call Location* which hunts out the Code function The Lynx also includes a machine-code monitor for de-bugging machine-code programs

To produce a completely new micro in 12 weeks is fast work Both John and Davis are about to take short holidays

After the break John will be back to work on the disc drives which have to be finished by November and Davis begins work on an enhanced Level 2 Basic which is planned for Spring 1983

*Camputers Lynx with typewriter style keyboard*

# Return of the prodigal son

**Paul Kriwaczek** *compares the NewBrain with the BBC micro*

Hello NewBrain, nice to see you at long last. Now don't just sit there on the table looking so smug. I remember when you were no more than a gleam in Uncle Clive's eye.

Of course, a lot has happened to you since then. Nearly aborted directly after conception, and then adopted twice by different step-parents. You were chosen for elevation to the priesthood as the BBC micro and then summarily defrocked. In the meantime, Clive gave birth to three legitimate computers of his own. Still, you're here now, so let's see what kind of a machine you've turned out to be.

What is uppermost in many people's minds is how you compare with Acorn's version of the BBC micro. So here we go.

An attractive box — plastic, but quite tough and sturdy — in a rather pleasant colour combination, cream and brown, with the NewBrain logo printed in script at the top left. This is considerably more attractive than the lurid orange livery in which I last saw NewBrain lurking. The lack of weight is quite surprising — 3lb according to my kitchen scales — but unlike NewBrain's stepbrothers from Sinclair, it has a feeling of quality about it. No executive briefcase would be embarrassed to contain it. And the small size is really remarkable — the BBC microcomputer is a giant by comparison. But then much of the expansion capability of the Acorn is already inside the box.

The connectors on the back of the NewBrain convey a message of quality too. They are small and elegant, adding little to the bulk of the box, and seemingly an industrial precision connector system. Unfortunately, this means you won't be able to connect anything to the NewBrain unless you get it direct from its manufacturer — or are in on the secret of where to get suitable plugs.

The connectors link the machine to power input, two cassette recorders (each with its own sensitivity adjustment), modem, printer and bus expansion for all the promised add-on modules. Output to the screen display is from two normal phono sockets, one for a tv and the other direct video to feed a monitor.

The keyboard, standard QWERTY configuration, is what one might call up-market calculator-style — something between Spectrum and IBM — but arranged whh keys the standard distance apart. At first sight, all the usual keys seem to be there. It takes some time to realise that there is neither a backspace nor a reset key. But in return, we have an intelligence test — something labelled Video Text (to which there is no reference in the manual and which does nothing noticeable to the display).

Good for word processing? I asked two secretaries of my acquaintance. No, they said. The keytops are too small — you'd keep getting your fingers stuck between them if you tried touch-typing. And the 'return' and 'shift' keys are the same size as the others — very easy to miss.

By comparison, the BBC micro's keyboard is more convenient to use. But though the BBC keyboard is larger, it too does not have a real quality feel to it.

But what the NewBrain does have, which makes it unique so far, is a built-in single line vacuum fluorescent display mounted at the top right of the box. This means that it can be used out of reach of a tv set or monitor, and even out of reach of a mains supply, provided you have the version with the added rechargeable batteries — and don't want to use it for more than 75 minutes.



*Paul Kriwaczek, Producer of the BBC's Computer Programme first shown earlier this year*

Only one small matter detracts from the smart executive jet set image. The small matter of the power supply. Small but heavy — heavier in fact than the computer itself, a nasty brown metal laboratory style unit. Here is something you would not wish to carry around in your briefcase, not for long anyway.

Another minor foible: there's no on-off switch. So for safety it has to be unplugged when not in use. It tells you so on the label right next to where it says: For Indoor Use



Only! I notice that the power supply doesn't feature in the glossy advertising photographs

So connect it to the tv, plug in the power supply and what happens? Nothing to start with, for what seems quite a long time. Wait a minute the tv may be blank but something is happening to the single-line display. What is it? It is garbage. 10 seconds worth. And then just when you start to wonder "shall I bang it?" — standard diagnostic treatment for hi tech apparatus — the single line display clears and the tv states "NEWBRAIN BASIC READY"

*NewBrain showing at top left of picture a so far unique built-in single line vacuum fluorescent display. All the ports are located at the back including the connector for the power pack. The keyboard has a standard QWERTY configuration but there is no backspace or reset key*

Now is the time to start studying what is known in the jargon as the documentation, ie the instruction manual. It looks good, ring bound, glossy covered, 204 pages of it. But it is not good. It is awful.

Mind you, a properly produced handbook would have deprived me of a good many laughs. Here's my favourite, from the bottom of page 92. "The user should type in the following carefully" it says, "although the effect may not be seen until it is completed." And that's all it says. Not a word more. It is followed by a blank space. Maybe it only appears in the handbook after you have completed typing whatever it is into the machine. Or maybe they meant you to read on to the next page. Who can tell?

But the instructions to load a program from a tape are reasonably clear. So let's do it. Here's a NewBrain demo tape supplied with the machine. Plug in cable between computer and recorder, type *Load*, run the tape and Hey Presto, it works ... almost.

What's this? 'Error 131.' Look it up in Appendix 1. 8 pages of error numbers. At the bottom of the seventh, here we are Error 131 — 'Tape read error: attempt to read block into a buffer which is too small, or hardware failure.' I don't understand what it means about the buffer so try again. Still no good? Oh well, cassette systems are always a little prone to failure.

I'm afraid that the NewBrain does not give a very user friendly first impression. Here the BBC micro impresses as being more appropriate to the beginner. There is no question but that the operating system is one of great sophistication but the very power of the device makes it more difficult to choose how to use it.

To start with there are a number of different type-faces which can be called up at the touch of a button. The problem is finding which button. The user manual tries to make it clear but one false step, easily achieved and the machine becomes insensible to your input, responding to whatever you type with error messages in Greek. (Yes, a Greek alphabet is one of the options.)

For those with systems experience, the powerful way the NewBrain handles its input output and files — as data streams all of which look identical to the operating system — will be very attractive. For beginners who merely wish to use the high-resolution graphics it will not be easy to cope with this sort of explanation in the user guide: "As the graphic stream is 'parasitic' upon the linked stream given in this parameter, it cannot function after that stream has been closed (even by an OPEN# 0 implicit close) and must therefore also be closed." This is a shame because the graphics software is very powerful indeed, giving far greater control, albeit as yet only in monochrome, than BBC Basic does over a screen of equivalent resolution.

The rest of the NewBrain Basic is, however, a disappointment. It is billed as enhanced ANSI and is unusual in being an interactive compiler. This means that on going through the Basic program the statements are all first translated into machine code and then run, unlike an interpreter

turn to page 20

*The printed circuit board with the memory board at left folded out flat*

# Open Forum

*Open Forum is for you to publish your programs and ideas*
*It is important that your programs are bug free before you send them in We cannot test all of them*
*Contributions should be sent to* Popular Computing Weekly, *Hobhouse Court,*
*19 Whitcomb Street, London WC2H 7HF*

## How to contribute

**Each week the editor goes through all the programs that you send to Open Forum in order to find the Program of the Week.**

**The author of that program will qualify for DOUBLE the usual fee we pay for published programs.**
**(The usual fee is £10)**

***Presentation hints***

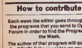
**Programs which are most likely to be considered for the Program of the Week will be computer printed and accompanied by a cassette**

**The program will be well documented, the documentation being typed with a double spacing between each line**

**The documentation should start with a general description of the program and then give some detail of how the program has been constructed and of its special features.**

**Listings taken from a ZX Printer should be cut into convenient lengths and carefully stuck down on to white paper, avoiding any creasing**

**Please enclose a stamped, self-addressed envelope.**



## Minivaders

### on Spectrum

Imagine that you are the sole defender of your planet, having at your disposal 3 mobile missile launchers and 100 missiles The Minivader Fleet Commander with 50 spaceships has ordered to invade your planet.

He sends them in one at a time The first 25 are from high altitude but the others can surprise you The spaceships are equipped with

Bombs (Type A) Specially designed to melt missile launchers

Bombs (Type B) These explode to leave craters you can't get your missile launcher past

A radiation diffuser which at close range will destroy your defence shields

Invisibility screens

Both types of bomb will also damage your defence shields Type B bombs fill in the craters left by Type A bombs

Although the bombs appear random, some are very accurate so keep moving You can move when a bomb is being dropped but you can't fire

**Program notes**

Key 0 To fire missile
1 To move left
2 To move right

LINE 2000 move launcher and check for missile firing
3000 fire missile
4000 flight of spaceship, check for hits and update
5000 drop bomb
6000 set up screen
8000 end game
8500 instructions
9000 USR graphics

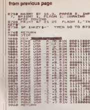
| | |
|---|---|
| a | gun position |
| high | best score so far |
| hits | number of spaceships destroyed |
| missiles | number of missiles remaining |
| lives | number of launchers left |

ALL As, Bs Cs are graphic
LINE 4020 32 spaces

Hits and highest score are shown at top of screen and the number of launchers left flashes at bottom right

```
1000 REM
1001 REM © K L RYLETT
1002 REM  MANCHESTER
1003 REM  26/08/82
1010 BORDER 0 PAPER 0 CLS
1020 PRINT AT 0 0, PAPER 1, INK 7, BRIGHT 1 MINIVADERS
1030 INPUT  INK 7 Do you want instructions ?
1040 IF a$(1)="y" OR a$(1)="Y" THEN GO SUB 8500
1050 GO SUB 9000
1060 LET high=0
1100 LET lives=3  LET hits=0
1110 LET missiles=100  LET a=10
1120 GO SUB 6000
1130 PAUSE 250
1140 GO TO 4000
2000 REM
2010 PRINT AT 21 a  BRIGHT 1, A
2020 LET a$=INKEY$
[illegible]
```

from previous page



```
8710 PRINT AT 16,3, PAPER 2, INK
 7, BRIGHT 1, FLASH 1, WARNING
     KEEP MOVING
8720 PRINT AT 21 25  FLASH 1,"IN
KEY$
8730 IF INKEY$=""  THEN GO TO 873
0
8740 RETURN
8800 STOP
9000 REM
9001 POKE USR  "A" +0 BIN 00011000
9002 POKE USR  "A" +1 BIN 00011000
9003 POKE USR  "A" +2 BIN 00011000
9004 POKE USR  "A" +3 BIN 00111100
9005 POKE USR  "A" +4 BIN 00111100
9006 POKE USR  "A" +5 BIN 01111110
9007 POKE USR  "A" +6 BIN 11111111
9010 POKE USR  "A" +7 BIN 11111111
9020 POKE USR  "B" +0 BIN 00000111
9021 POKE USR  "B" +1 BIN 00011111
9022 POKE USR  "B" +2 BIN 00111111
9023 POKE USR  "B" +3 BIN 11111000
9024 POKE USR  "B" +4 BIN 11111000
9025 POKE USR  "B" +5 BIN 00111111
9026 POKE USR  "B" +6 BIN 00011111
9027 POKE USR  "B" +7 BIN 00000111
9030 POKE USR  "C" +0 BIN 11100000
9031 POKE USR  "C" +1 BIN 11111000
9032 POKE USR  "C" +2 BIN 11111100
9033 POKE USR  "C" +3 BIN 00011111
9034 POKE USR  "C" +4 BIN 00011111
9035 POKE USR  "C" +5 BIN 11111100
9036 POKE USR  "C" +6 BIN 11111000
9037 POKE USR  "C" +7 BIN 11100000
9040 RETURN
```

**Minivaders**
*by Keith Rylett*

## Pathfinder

on ZX81

Pathfinder is a game involving quick thinking and accurate timing. It is written completely in Basic for the ZX81 but runs surprisingly fast due to the extensive use of direct manipulation of the display file by *Peek* and *Poke* commands.

Instructions are given in the program but the aim is to hit as many "X" targets as possible by steering your star around the screen with the cursor keys. If you crash into a used (inverse "X") target, the boundary, or your own trail, the game is over and your score is printed. On-screen scoring and changeable delay factor have been introduced for interest.

It requires a minimum of 5K memory. My record score is 48 targets on delay factor 0.

```
   1 REM ****************1982
   2 REM POKERT A SLADE   1982
   3 REM     8000 TO SAVE
   5 SLOW
  10 GOTO 80
  20 LET C=(B$="6")*33-(B$="7")-
33*(B$="5")-(B$="8")
  29 RETURN
  80 GOSUB 2000
  90 GOSUB 9000
 100 GOSUB 1000
 110 POKE P,23
 115 LET Z(H)=P
 130 LET B$=INKEY$
 140 IF CODE B$>32 AND CODE B$<3
7 THEN GOSUB 20
 150 LET P=P+C
 160 IF PEEK P<>0 THEN GOTO 200
 165 LET H=H+1
 180 POKE P,151
 185 IF NOT DL THEN GOTO 110
 186 FOR F=1 TO DL
 187 LET B$=INKEY$
 188 NEXT F
 197 GOTO 110
 200 IF PEEK P=61 THEN GOTO 300
 202 FOR F=1 TO 10
 204 POKE P,0
 205 LET JJ=RND*400
 206 POKE P,134
 207 NEXT F
 210 CLS
 220 PRINT AT 11,0;"TOO BAD,YOU
CRASHED"
 225 PRINT TAB 5,"BUT YOU HIT ";
N;" TARGET";("S" AND N<>1);".-"
 230 PRINT AT 21,0;"DO YOU WANT
ANOTHER GO?"
 235 POKE 16418,2
 240 INPUT Y$
 245 IF Y$="" THEN GOTO 240
 250 IF Y$(1)<>"Y" THEN STOP
 255 CLS
 270 RUN 80
 300 LET N=N+1
 310 POKE P,189
 320 FOR X=1 TO H
 340 POKE Z(X),0
 350 NEXT X
 355 PRINT AT 23,10;N
```

## Dragon Tip

on Dragon 32

This program makes use of the fact that the machine will *Load* and *Skip* from within a program. It would normally be used as an index on a tape with finished programs. It takes less than half a minute to load and saves the tedious use of the *Skipf* command in locating a program.

Lines 10-20 Clear the screen
Lines 30-70 Read and display the contents of the data on screen
Line 60 is a loop to slow the display down and is not needed if the tape has less than 10 programs on it.

The gap between lines 100 and 500 is for the addition of *Data* statements. A typical line would read, 100 DATA "(1) SPACE INVADERS

Line 500 is an empty string to branch the program using line 50 to line 60000
Line 510 waits for you to continue, and could be replaced by an *Inkey*
Line 520 deletes the program up to and including line 520
Lines 60000-60050 skip the programs and load the one that you require, then delete themselves leaving only the required program in memory

This will only, of course, work for programs numbered below 60000, but the program can be relocated in any position to suit. A *Run* command could be added at line 60060 and the program will self execute on completion.

```
   10 REM —INDEX—
   20 CLS
   30 FOR A = 1 TO 100
   40 READ A$: PRINT A$
   50 IF LEN (A$) < 1 THEN 60000
   60 FOR Z = 1 TO 1000: NEXT
   70 NEXT A
  500 DATA
  510 LINE INPUT "PRESS ANY KEY TO CON-
      TINUE"; Z$
  520 DEL 10 — 520
60000 INPUT "NUMBER OF PROGRAM RE-
      QUIRED"; N
60010 FOR A = 1 TO (N - 1)
60020 SKIPF
60030 NEXT A
60040 CLOAD
60050 DEL 60000 — 60050
```

The program, if entered as set out, will work for any length of tape, but if the program contents exceed it will scroll and display the last 10 lines. Line 500 must not be left out, otherwise the program will stop with OD in line 40 (out of data).

Provided that enough space is left at the beginning of the tape, data lines containing extra programs can be added up to a maximum set by line 30.

```
 360 LET H=1
 370 GOSUB 9000
 380 GOTO 130
1000 POKE 16418,0
1002 CLS
1005 PRINT AT 0,0;"▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀"
1010 FOR F=1 TO 21
1020 PRINT TAB 0;"█";TAB 31;"█"
1030 NEXT F
1040 PRINT "▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀"
1050 PRINT AT 23,0;"TARGETS HIT
 N"
1060 GOSUB 3000
1500 RETURN
2000 REM ▀▀▀▀
2010 LET N=0
2020 LET P=PEEK 16396+256*PEEK 1
6397
2030 LET P=P+300
2040 LET C=-1
2100 DIM Z(400)
2070 LET H=1
2080 RETURN
3000 LET F=INT (RND*20)+1
3010 LET X=INT (RND*25)+1
3020 PRINT AT F,X
3030 IF PEEK (PEEK 16396+256*PEE
K 16397)(1)0 THEN GOTO 3000
3050 PRINT AT F,X;"X"
3060 RETURN
8000 REM SAVE
8010 SAVE "PATHFINDER"
8020 RUN
9000 PRINT "CONTROL THE FLASHIN
G STAR";"DIRECTION USING ""7""
FOR UP ;TAB 15;""6"" DOWN
,TAB 15;""5"" LEFT ,TAB 15
;""8"" RIGHT
9010 PRINT ,;"TRY TO HIT THE
X"" AS MANY ";"TIMES AS POSSIBLE
 BEFORE YOU ";"CRASH INTO THE BOR
DER,YOUR TRAIL";" OR A ""█"""
9020 PRINT ,;"WHAT IS YOUR DELAY
 FACTOR ?"
9030 PRINT "     (0 TO 9)
9040 INPUT DL
9050 IF DL<0 OR DL>9 THEN GOTO 9
040
9070 PRINT AT 21,0;"PRESS A KEY."
9080 IF INKEY$="" THEN GOTO 9080
9085 RETURN
```

**Pathfinder**
*by Robin Hade*

## Snatch

on Spectrum

Whilst looking for new ideas for computer games, I thought of combining Space Invaders with the fairground Hook machine, where you have to try to grab prizes with a large claw. The game I came up with is called Snatch and is a cross between the two.

The listing contains a full set of instructions and *Rem* statements to tell the user what the computer is doing.

```
   1 REM set up hires graphics
   5 LET s=15
  10 BORDER 0: PAPER 0: INK 1
  20 FOR n=0 TO 7
  30 READ a
  40 POKE USR "a"+n,a
  50 NEXT n
  60 FOR n=0 TO 7
  70 READ b
  80 POKE USR "b"+n,b
  90 NEXT n
 100 FOR n=0 TO 7
 110 READ c
 120 POKE USR "c"+n,c
 130 NEXT n
 140 FOR n=0 TO 7
 150 READ d
 160 POKE USR "d"+n,d
 170 NEXT n
 180 FOR n=0 TO 7
 190 READ e
 200 POKE USR "e"+n,e
 210 NEXT n
 220 FOR n=0 TO 7
 230 READ f
 240 POKE USR "f"+n,f
 250 NEXT n
 260 FOR n=0 TO 7
 270 READ g
 280 POKE USR "g"+n,g
 290 NEXT n
 300 FOR n=0 TO 7
 310 READ h
 320 POKE USR "h"+n,h
 330 NEXT n
 332 REM instructions
 335 INPUT AT 5,0;"instructions?
";i$: IF i$="" THEN GO TO 420
 340 PRINT AT 2,8;"SNATCH   BY
";AT 4,9;"DJ VECKANS";AT 7,0;"Wel
come to snatch.The computer ";AT
8,0;"will print an alien city w
ith";AT 9,0;"buildings.On these
are northern";AT 10,0;"in space
pods.you have to rescue";AT 11,0
;"them with your man(A)that move
s"
 350 PRINT AT 12,0;"across the s
creen.You control   him with the
 1 key for up and   the 0 key fo
r down";AT 15,0;"BUT BEWARE if y
our man hits the buildings he di
es ALSO watch out for the cities
 defences"
 360 FOR n=-25 TO 20 STEP 3: BEE
P .01,n: NEXT n: PAUSE 500
 370 CLS
 400 REM draw graphics
```

to next page

from previous page

```
430 FOR n=13 TO 21: PRINT AT n,
0,"■",AT n,12,"■";AT 13,0,"__",AT
13,15,"__": NEXT n
435 FOR n=10 TO 21: PRINT AT n,
1;"■■■";AT n 6,"■■";AT n,18,"■
";AT 10 1,"__",AT 10,2,"__",AT
10 10,"__",AT 10 3,"__",AT 10 3
: NEXT n
440 FOR n=12 TO 21: PRINT AT n,
20;"■■";AT 12 22,"__": NEXT n: F
OR n=16 TO 21: PRINT AT n,24,"■■"
,AT n 30,"■";AT 16 28,"__",AT 1
6,30,"__": NEXT n
442 PRINT AT 10,10,"__",
AT 19,10,"__",AT 20,10,"__",
AT 21,10,"__"
443 PRINT AT 17,15,"■■■■■■■■",AT
18,15,"SCORE"
444 PRINT AT 19,15;"■■■■■■■■",AT
20,15,"________"
445 INK 2
450 PRINT AT 17,12, BRIGHT 1,"A
",AT 18,12, BRIGHT 1,"I",AT 16,4
, BRIGHT 1,"A",AT 19,4, BRIGHT 1
,"I"
460 PRINT AT 17,8, BRIGHT 1,"A"
,AT 18,8, BRIGHT 1,"I",AT 17,31,
BRIGHT 1,"A",AT 18,31, BRIGHT 1
,"I"
465 PRINT AT 10,17, BRIGHT 1,"A
",AT 10,17, BRIGHT 1,"I",AT 11,1
8, BRIGHT 1,"A",AT 15,18, BRIGHT
1,"I"
470 PRINT AT 11,20, BRIGHT 1,"A
",AT 12,23, BRIGHT 1,"I",AT 16,2
6, BRIGHT 1,"A",AT 18,20, BRIGHT
1,"I"
475 PRINT AT 0,0,"A",AT 0,31,"A
"
480 PRINT AT 8,0,"A",AT 8,31,"A
"
482 REM set your own moving scr
ess ins screen
483 LET k=3
485 LET l=0
500 LET n=0
505 LET a=.48
508 IF n1=27 THEN LET n=1
510 LET a$=INKEY$
520 IF a$="1" AND k<00 THEN LET
k=k+1
530 IF a$="5" AND k>3 THEN LET
k=k-1
540 LET n=n+4: LET k=k+1
600 LET c=INT (RND*10)
605 PRINT AT 2,n; INK 0,"■■"
BEEP .01,30
606 REM fire gun
607 IF c=6 THEN PLOT 0,104: DRA
W 255,0: PLOT 0,104: DRAW INVERS
E 1,255,0
608 IF c=7 THEN PLOT 0,100: DRA
W 255,0: PLOT 0,100: DRAW INVERS
E 1,255,0
609 IF c=6 AND x=0 THEN GO TO 3
000
610 IF c=7 AND x=0 THEN GO TO 3
000
615 PRINT AT 0,n
616 PRINT AT x,n+2, INK 0,"@"
BEEP .01,00: PRINT AT x,n+2, INK
0,"A";AT x,n+3,
619 REM check if your man has h
it the building or rescued anyon
e
620 IF ATTR (x+1,n+2)=40 THEN G
O TO 1000
630 IF ATTR (x+1,n+2)=114 THEN
GO TO 2000
670 GO TO 600
900 REM routine for when you hi
t a building
1000 CLS : FOR n=30 TO -30 STEP
-3: BEEP .05,n: BEEP .05,n-10
1010 BORDER INT (RND*7): NEXT n
1020 FOR n=0 TO 30 STEP 2
1030 PRINT AT n,0;"■■■■■■■■■■■■■■"
1040 NEXT N
1050 PAUSE 100: CLS : GO TO 400
1999 REM routine for if you resc
ue a man
2000 FOR g=34 TO -30 STEP -3: BE
EP .01,g: NEXT g
2010 LET p=p+1
2020 PRINT AT 21,p,"I",AT 20,p,
"A"
2030 PRINT AT x+1,n+2," ",AT x+0
,n+2," ": GO TO 400
2999 REM routine for if you get
shot
3000 CLS
3010 PRINT AT 0,0, "you got shot
dead"
3030 FOR n=0 TO 8
3040 FOR g=0 TO 60 STEP 4: BEEP
.01,g: NEXT g: NEXT n
```

**PROGRAM OF THE WEEK**

```
3080 RUN
8999 REM data for graphics
9000 DATA BIN 00011111,BIN 00111
111,BIN 01111111,BIN 11111111,BI
N 11100000,BIN 11000000,BIN 0110
0110,BIN 00111100
9010 DATA BIN 11111111,BIN 11111
111,BIN 00111100,BIN 11111111,BI
N 11111111,BIN 00011000,BIN 0001
1000,BIN 00011000
9020 DATA BIN 11111000,BIN 11111
100,BIN 11111110,BIN 11111111,BIN
00000111,BIN 00000011,BIN 01100
110,BIN 00111100
9030 DATA BIN 00011000,BIN 00111
100,BIN 01011010,BIN 10011001,BI
N 11111111,BIN 01000010,BIN 0110
0110,BIN 00100100
9040 DATA BIN 00011000,BIN 00111
100,BIN 01011010,BIN 10011001,BI
N 11111111,BIN 01000010,BIN 1000
0001,BIN 10000001
9050 DATA BIN 00111000,BIN 00111
000,BIN 00111000,BIN 00010000,BI
N 11111110,BIN 10111010,BIN 1011
1010,BIN 10111010
9060 DATA BIN 10111010,BIN 00101
000,BIN 00101000,BIN 00101000,BI
N 00101000,BIN 00101000,BIN 0110
1100,BIN 0
9070 DATA BIN 10011001,BIN 10011
001,BIN 10011001,BIN 11111111,BI
N 10011001,BIN 10011001,BIN 1001
1001,BIN 11111111
```

SCORE

Snatch
*by Jonathon Yeomans*

## Black Hole

### on Vic-20

This is a space invader game with a difference. At any one time three invaders pass in front of you from the top of the screen (each having a different score value) and which you simply have to shoot. You can shoot the alien when it appears anywhere in the sight.

But beware: there are six invisible black holes in front of you. You will be sucked into the black hole when the centre of the sight passes over one of these holes. Should you fall into a black hole then all accumulated scores are lost.

You have a limited amount of ammunition and a limited amount of time to shoot as many invaders as possible. At the top of the screen the running score and elapsed time is shown.

A good average for the game is 100. The best score for the game so far is 240. All keyboard directions are shdwn in the instructions.

The program runs in a minimum of 6.5K and can also be used without any modification with any memory above that level. All subroutines are covered in the program listing by *Rem* statements.

```
270 PRINT"■■■■ ■  BLACK HOLE  ■ ■"

1 REM (C) 1982
2 REM N.ECKERSLEY
3 POKE36879,40
240 PRINT"■■■■■■■■■■■■■              ■
250 PRINT"■■■■ ■                 ■ ■"
260 PRINT"■■■■ ■                 ■ ■"
270 PRINT"■■■■ ■  BLACK HOLE     ■ ■"
280 PRINT"■■■■ ■                 ■ ■"
290 PRINT"■■■■ ■                 ■ ■"
300 PRINT"■■■■                   ■
310 FORA=1TO3000:NEXT
320 PRINT"■":POKE36879,104:DIMT(20)
330 PRINT"■■■■■■■■■■INSTRUCTIONS(Y/N)";
340 GETA$
350 IFA$="Y"THEN10000
360 IFA$="N"THEN12166
370 GOTO340
380 REM INITIALISATION
381 SC=0:COD=30720:J1=7702:J2=38084:S=7910:
    J3=8164:J4=8140:J5=7725:J6=7680
382 PRINT"■":IFPEEK(409■)=32THENGOSUB50000
390 POKE36879,104:PRINT"■
391 FORLS=1TO20
392 POKEJ3+LS,102:POKEJ2+LS,7:IFLS<=5THENPOKE
    J2+LS,2
393 NEXTLS:VL=20
399 FORC=1TO100
400 B=INT(RND(1)*450)+J1
410 POKEB,46
411 NEXTC
420 FORD=1TO6
430 E(D)=INT(RND(1)*400)+J1
450 NEXTD
451 REM SIGHT MOVEMENT
454 TI$="000000":VAR=99.99:GOSUB470:VAR=0
455 GETMS$:POKE198,0
456 PRINT"■"TAB(12)"TIME:"MID$(TI$,4,1)".
    "RIGHT$(TI$,2)
457 IFTI$>"000200"THENWE7=1:GOTO20000
458 IFTA<1THEN490
459 IFMS$=""THEN590
460 IFMS$="K"THENGOSUB6000
461 IFOI=99.99THENY7=99.99:GOSUB7000:GOSUB468:
    Y7=0:GOTO491
462 IFMS$="I"THENGOSUB5000:S=S-22
463 IFMS$="J"THENGOSUB5000:S=S-1
464 IFMS$="L"THENGOSUB5000:S=S+1
465 IFMS$="M"THENGOSUB5000:S=S+22
466 FORD=1TO6:IFS=E(D)THENWE7=2:GOTO20000
467 NEXTD
468 IFS>=J4THENS=J4
469 IFS<=J5THENS=J5
470 REM DRAW.SIGHT
471 POKES+1,67:POKES-1,67:POKES-22,66:
    POKES+22,66
480 POKES+23,122:POKES+21,76:POKES-23,79:
    POKES-21,80
481 IFY7=99.99THENRETURN
482 IFVAR=99.99THENRETURN
489 GOTO550
490 PRINT"■"TAB(12)"TIME:"MID$(TI$,4,1)".
    "RIGHT$(TI$,2)
491 OI=0
492 REM ALIEN MOVEMENT
493 FORXX=1TO5
```

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```
500 TT=INT(RND(1)*9)+1
510 IFTT<=5THENG(XX)=90:COL(XX)=3
520 IFTT>5THENG(XX)=98:COL(XX)=7
530 IFTT>8THENG(XX)=65:COL(XX)=5
540 NEXTXX
551 FORVV=1TO3
556 PRINT" TAB(12)"TIME:"MID$(TI$,4,1)"."RIGHT$
    (TI$,2)
560 F(VV)=INT(RND(1)*462)+J1
570 POKEF(VV),G(VV):POKECOD+F(VV),COL(VV)
580 NEXTVV
590 PRINT" TAB(12)"TIME:"MID$(TI$,4,1)"."RIGHT$
    (TI$,2):VAR=55.55:GOSUB460:VAR=0
591 FORT=1TO3:IFF(T)=0THENF(T)=INT(RND(1)*22)+J1
600 NEXTT:GOSUB9600
612 FORRR=1TO3
613 WW=INT(RND(1)*3)+1
620 IFWW=1THENA(RR)=22
630 IFWW=2THENA(RR)=23
640 IFWW=3THENA(RR)=21
660 NEXTRR
680 FORXX=1TO3
690 POKEF(XX),32:POKECOD+F(XX),1:F(XX)=F(XX)+A(X
    X):IFF(XX)>J3THENF(XX)=0:GOTO550
700 POKEF(XX),G(XX):POKECOD+F(XX),COL(XX)
710 NEXTXX:TR=2:GOTO455
1092 IFQA=90ORQA=98ORQA=65THENPOKES,42:FOROB=1TO
     100:NEXT:POKES,32
5000 POKES+23,32:POKES+21,32:POKES-23,32:
     POKES-21,32
5010 POKES+1,32:POKES-1,32:POKES-22,32:
     POKES+22,32
5020 RETURN
5999 REM FIRING
6000 POKEJ3+VL,32:VL=VL-1:IFVL<0THENWE7=3:
     GOTO20000
6001 FP(1)=0
6002 FP(2)=22
6003 FP(3)=23
6004 FP(4)=21
6005 FP(5)=-1
6006 FP(6)=1
6007 FP(7)=-22
6008 FP(8)=-23
6009 FP(9)=-21
6010 FORRT=5TO1STEP-1
6011 E3=S+RT
6012 E4=S-RT
6017 POKE36878,15:POKE36876,231:POKE36878,0:
     POKEE3,67:POKECOD+E3,2
6018 POKEE4,67:POKECOD+E4,2
6019 FORAA=1TO30:NEXT
6021 POKEE3,32:POKECOD+E3,1
6022 POKEE4,32:POKECOD+E4,1
6025 NEXTRT
6027 FORRE=1TO3
6028 POKEF(RE),G(RE)
6029 NEXTRE
6030 FORRF=1TO9
6040 QA=PEEK(S+FP(RF))
6050 IFQA=90THENSC=SC+10:GOTO9000
6060 IFQA=98THENSC=SC+15:GOTO9000
6070 IFQA=65THENSC=SC+25:GOTO9000
6080 NEXTRF
6081 POKES,51:FORPL=1TO30:POKES,42:FORPL=1TO30:
     POKES,32
6090 RETURN
7000 FORYU=1TO3
7010 POKEF(YU),32:NEXT
7020 RETURN
9000 REM EXPLOSION
9001 OI=99.99:FORRG=1TO3:POKECOD+F(RG),1:NEXTRG
9002 PRINT" SCORE ";SC
9003 AB=42:GOSUB9500:AB=81:GOSUB9500:AB=87:
     GOSUB9500
9005 AB=46:GOSUB9500:AB=32:GOSUB9500:F(NE)=
     0:NEXTRF
9500 POKE36878,15
9511 FORLL=220TO230
9512 POKE36876,LL
9513 NEXTLL
9514 POKE36878,0
9515 POKE36876,0
9516 POKES,AB:POKES+1,AB:POKES-1,AB:POKES+22,AB:
     POKES-22,AB
9517 IFS-44>J1THENPOKES-44,AB
9518 IFS+44<J3THENPOKES+44,AB
9519 POKES-2,AB:POKES+2,AB:POKES-23,AB:POKES-21,
     AB
9520 POKES+21,AB:POKES+23,AB:RETURN
9600 B=INT(RND(1)*450)+J1:IFPEEK(B)<>32THEN9600
9620 POKEB,46
9640 RETURN
10000 REM INSTRUCTIONS
10001 PRINT"YOU ARE THE CAPTAIN OFTHE S.S.
      BOUNTY.YOU AREUNDER ATTACK BY ALIENS"
10030 PRINT"YOU HAVE ONLY 20 SHOTSLEFT.THEY ARE
      SHOWN"
10040 PRINT"AT THE BOTTOM OF THE  SCREEN."
10050 PRINT" BEWARE THERE ARE 6   INVISIBLE
      BLACK HOLES.IF YOUR SIGHT RUNS"
10051 PRINT"OVER ONE OF THESE      THEN THAT I AM
      AFRAID"
10060 PRINT"IS THE END OF YOU ANDYOUR SHIP"
10061 PRINT"ALSO YOUR FORCE FIELD REPORTS THAT
      YOU CAN  ONLY  LAST FOR 2 MIN. OF ATTACKS"
10070 PRINT"PRESS SPACE TO CONT."
10080 GETA$:IFA$<>" "THEN10080
10090 PRINT"  SIGHT MOVEMENTS"
10100 PRINT" __________________"
10110 PRINT"          UP"
10120 PRINT"           "
10121 PRINT"          I"
10123 PRINT
10130 PRINT"LEFT  J      L RIGHT"
10140 PRINT
10150 PRINT"          M"
10160 PRINT
10161 PRINT"        DOWN"
10163 PRINT"PRESS 'K' TO FIRE"
10164 PRINT"PRESS SPACE TO CONT."
10165 GETA$:IFA$<>" "THEN10165
10166 PRINT"ALIEN SCORING"
10167 PRINT"_____________"
10168 READII$:IFII$="#"THEN12166
10169 FORWS=1TOLEN(II$)
10170 PRINT" TAB(20)MID$(II$,WS,1)
10171 PRINT" CHR$(20):FORDELAY=1TO150:
      NEXT
10172 NEXTWS:GOTO10168
10173 DATA"..... .. -- 10 PTS,......... --
      15 PTS"
10174 DATA"..... -- 25 PTS.,.."
10175 DATA #
12166 GOTO300
20000 REM END.ROUTINES
20001 IFWE7=1THEN20050
20010 IFWE7=2THEN20070
20020 IFWE7=3THEN20100
20050 PRINT"T.I.M.E...O.U.T--!!";
20060 PRINT"YOUR SCORE WAS "SC" "
      GOTO20200
20070 FORD=1TO6:FORDEL=1TO450:NEXT:POKECOD+E(D),
      1:POKEE(D),32:POKEE(D),81:NEXTD
20071 FORDEL=1TO2000:NEXT:FORSR=8TO15:PRINT""
20080 POKE36878,15:PEKE36876,220:POKE36878,0
20090 POKE36879,SR:FORTM=1TO300:NEXT:GOSUB60000:
      NEXT:GO^HB20000:GOTO20200
20100 PRINT"OUT OF AMMUNITION"
20110 PRINT"YOUR SCORE WAS "SC" "
20200 PRINT"PRESS SPACE FOR
      ANOTHER GAME"
20210 GETA$:IFA$<>" "THEN20210
22020 GOTO300
30000 PRINT" YOU HAVE BEEN SUCKED
      INTO A BLACK HOLE":RETURN
50000 COD=33792:J1=4110:J2=38372:S=4371:
      J3=4580:J4=4556:J5=4141:J6=4096
50010 RETURN
60000 FORA=1TO10
60010 B=INT(RND(1)*506)+J6
60020 C=INT(RND(1)*255)+1
60030 POKEB,C:FORDO=1TO50:NEXT:PRINT"":NEXT:
      RETURN
```

**Black Hole**
*by Neil Eckersley*

## Moon Lander

### on BBC Micro

In this version of "Lunar Lander", for the Model A, you are the pilot of a descending moon shuttle low on fuel and desperate to land. The landing pad is clearly defined and is at the bottom of a precipitous valley.

"Z" and "X" control horizontal drift and ":" controls descent rate. Time, fuel and drift are displayed at the top of the screen. An added difficulty is that drift has to be less than + −5 to avoid total annihilation on landing.

The combination of mode 5's colour and graphics is used to its full. *VDU 23* is used to define the space shuttle and remove the omni-present flashing cursor. *VDU 5* allows text to be used in graphics mode with high resolution manoeuvrability.

This means the shuttle can move one row of pixels at a time. Sound effects are incorporated in the listing and *Rule Britannia* is played after a successful landing.

```
10 REM******************
20 REM** MOON LANDER **
30 REM** (C)P.D. 1982**
40 REM******************
50 X$="M O O N  L A N D E R":MODE7:VDU23;8202;0;0;0;:PRINTTAB(7,10);CHR$
&82;CHR$141;X$;
60 PRINTTAB(7,11);CHR$&82;CHR$141;X$;TAB(4,16);"Z=LEFT JET; X=RIGHT JET;
:=ROCKETS"
70 PRINTTAB(3,19);"MAXIMUM VELOCITY WHEN LANDING=5";TAB(4,23);"Press the
 SPACEBAR to continue";:REPEATUNTILGET=32
80 MODE5:VDU23;8202;0;0;0;:VDU5:ONERRORRUN
90 VDU19,3,6,0,0,0
100 GCOL0,3:FORX=0TO40:PLOT69,RND(1280),RND(400)+510:NEXT:GCOL0,2
110 MOVE-200,0:MOVE500,0:PLOT85,100,700:MOVE300,200:MOVE400,50:PLOT85,35
0,400:MOVE100,500:MOVE250,400:PLOT85,220,720
120 MOVE780,0:MOVE1480,0:PLOT85,1180,740:MOVE1000,0:MOVE780,0:PLOT85,900
,400
130 MOVE900,200:MOVE1280,200:PLOT85,RND(50)+550,RND(30)+560:MOVE500,0:MO
VE300,100:PLOT85,RND(100)+500,RND(35)+400
140 VDU23,255,0,0,0,0,255,255,255,255
150 VDU23,226,126,129,153,165,165,153,129,126:VDU23,227,24,60,126,126,12
6,126,90,24:VDU23,228,0,0,60,0,60,0,0,0
160 VDU23,225,60,126,90,126,255,153,18
170 VDU23,240,16,32,64,255,255,64,32,16:VDU23,241,8,4,2,255,255,2,4,8,:V
DU23,242,24,24,24,24,153,90,60,24
180 GCOL0,1:MOVE548,32:PRINTCHR$255;CHR$255;CHR$255;
190 GCOL0,3:MOVE0,910:DRAW1280,910
200 X=RND(1000):Y=RND(200)+700:FU=250
210 *FX11,1
220 *FX12,1
230 VV=0:HV=RND(20)-10
240 A$=INKEY$(0):VV=VV+1:F=0:J=0
250 VDU4:PRINTTAB(0,0);CHR$240;CHR$241;"     ";TAB(10,0);CHR$242;"    ";TA
B(15,0);"F=    ;TAB(0,2);"B=    ";TAB(10,2);
260 PRINT"H=      ";TAB(2,2);(-640-(X+32));TAB(12,2);Y;TAB(2,0);HV;TAB(17
,0);FU:VDU5
270 *FX15,0
280 GCOL0,0:MOVEX,Y:PRINTCHR$225;
290 IFFU<=0 FU=0:GOTO330
300 IFA$="Z" HV=HV+1:J=-1:FU=FU-1
310 IFA$="X" HV=HV-1:J=1:FU=FU-1
320 IFA$=":"VV=VV-4:F=1:FU=FU-3
330 VDU4:PRINTTAB(11,0);VV;VDU
340 Y=Y-VV:X=X+HV:IFY>900 Y=900
350 IFPOINT(X,Y-32)=2 OR POINT(X+8,Y)=2 OR POINT(X+16,Y-32)=2 OR POINT(X
+24,Y-32)=2 PROCCRASH
360 IFPOINT(X+24,Y-32)=2 OR POINT(X+32,Y-32)=2 OR POINT(X+40,Y-32)=2 OR
POINT(X+48,Y)=2 OR POINT(X+56,Y-32)=2 PROCCRASH
370 IFABS(640-(X+32))<=40 AND POINT(X+32,Y-32)=1 PROCLAND
380 IFY<16 PROCCRASH
390 GCOL0,3:MOVEX,Y:PRINTCHR$225;
400 IFF=1 AND Y>80 SOUND4,-15,6,10:GCOL0,1:MOVEX,Y-32:PRINTCHR$227;
410 IFJ=1 GCOL0,1:MOVEX+64,Y:PRINTCHR$228;:SOUND4,-15,12,10
420 IFJ=-1 GCOL0,1:MOVEX-64,Y:PRINTCHR$228;:SOUND4,-15,12,10
430 IFF=1 AND Y>80 GCOL0,0:MOVEX,Y-32:PRINTCHR$227;
440 IFJ=1 GCOL0,0:MOVEX+64,Y:PRINTCHR$228;
450 IFJ=-1 GCOL0,0:MOVEX-64,Y:PRINTCHR$228;
460 GOTO240
470 DEF PROCCRASH
480 FORP=0 TO 255 STEP 7:SOUND43,-15,P,2:NEXT:SOUND4,-15,6,20
```

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```
490 GCOL0,1:MOVEX,Y:PRINTCHR$226:
500 FORX=1TO6:VDU19,1,X,0,0,0:NEXT:GOTO500
510 DEF PROCLAND
520 IF VV>5 PROCCRASH
530 GCOL0,7:MOVEX,Y:PRINTCHR$225:
540 FORS=1TO11:READP,D
550 IFP=999 L=0 ELSE L=-15
560 SOUND1,L,P,D:SOUND1,0,0,3:NEXT
570 GOTO570
580 DATA97,15,97,5,101,5,101,5,999,5,97,5,101,10,97,2,89,5,81,5,77,1
```

**Moon Lander**
*by Paul Driscoll*

## Patterns

on BBC Micro

This program is loosely based on the random number feature of the BBC Micro. It uses high resolution graphics as well as unique sound effects. To end this program it will be necessary to press the escape key. The patterns are built up entirely of straight lines and have a range of seven different colours.

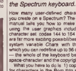
```
10 REM ******************************
20 REM ******************************
30 REM ******************************
40 REM ***                        ***
50 REM ***    P A T T E R N S     ***
60 REM ***                        ***
70 REM ***         B Y            ***
80 REM ***                        ***
90 REM ***     M A T T H E W      ***
100 REM ***                       ***
110 REM ***     K E E L I N G     ***
120 REM ***                       ***
130 REM ******************************
140 REM ******************************
150 REM ******************************
160 T = 0
170 ON ERROR GOTO 690
180 S = 0
190 MODE 7
200 PRINT ,SPC(80),"TYPE IN ONE LETTER TO START THE
 PATTERN GENERATOR"
205 *FX 15,1
210 A$ = GET$
215 *FX 15,1
220 MODE 2
230 L = RND(6)
240 GCOL 0,L
250 L = 7 - L
260 VDU 19,0,0,0,0,0,19,1,0,0,0
270 LET B = 0
280 LET X = 0
290 LET C = 1200
300 LET D = 1200
310 V = RND(40)
320 LET Y = Y + 10
330 MOVE 1200,0
340 LET X = X + Y
350 SOUND 1,-10,S,1:SOUND 2,-9,190-S,1
360 IF S < 0 T = 0
370 IF S > 180 T = 1
380 IF T = 0 S = S + 4 ELSE S = S - 4
390 LET B = B + Y
400 LET C = C - (V/1000*1200)
410 LET D = D - (V/1000*1000)
420 DRAW 0,X
430 MOVE X,0
440 DRAW 1200,B
450 MOVE 0,1000
460 DRAW 1200,C
470 MOVE 1200,1000
480 DRAW 0,0
490 IF X < 1024 GOTO 330
500 SOUND 1,-15,S,1
510 S = S + 1
520 GOTO 600
600 TIME = 0
610 REPEAT
620 SOUND 1,-15,S,1
630 IF T = 1 S = S - 1 ELSE S = S + 1
640 IF S > 180 T = 1
650 IF S < 0 T = 0
660 UNTIL TIME > 200
670 S = 0
680 GOTO 190
690 MODE 7
700 PRINTTAB(0,3)""
710 INPUT"DO YOU WANT ANOTHER GO"G$
720 IF G$ = "Y" OR G$ = "YES" GOTO 190
730 IF G$ = "N" OR G$ = "NO" GOTO 740
 ELSE GOTO 690
740 MODE 7
750 END
```

**Patterns**
*by Matthew Keeling*

From page 13

which does the translation at the same time as running the program There are speed advantages to the NewBrain s approach, but as, unlike most compilers, this one is interactive it means that the lay user is unlikely to be aware of any difference

The error messages, in my view, belong to another era They are numbers nearly 200 of them I have never felt that the traditional *Syntax error* was an adequate response Many newer computers not just the BBC s have improved their messages to the user I know that full error messages take up valuable memory but *Error* 21 and its relatives are hardly going to appeal to the first time computer tyro



The NewBrain really is a most extraordinary combination of crude and ultra-sophisticated features So how finally, does it compare with Acorn s BBC micro-computer? I think it is clear that it is by no stretch of the imagination suitable for the beginner Not having colour and sound its appeal to the home user will be limited although games will undoubtedly be written for it.

What the NewBrain s designers have succeeded in creating is a kind of professional s ZX The operating system s power will make it very attractive to software writers producing dedicated applications and particularly those which require the use of advanced graphics It will of course, be configured to run CP M when it gets its disc drives, and then a whole world of spreadsheets and similar packages will become available to it

While the NewBrain is strictly speaking, portable its potential is somewhat diminished by the heavy separate power supply and the limited lifespan of its batteries It s communication facilities are good so there is a role for it as a peripatetic intelligent terminal speaking to the host machine via a modem down the telephone lines As a word processor this lets it down but as a data-capture terminal it is nearly ideal

But for a machine of this level of sophistication its price is remarkably low — £199 + VAT for the basic version This in itself represents a considerable achievement on the part of its designers

As a challenge to the enthusiast or the professional I have no doubts about its future popularity Who would want one? I would There is plenty of room in the market both for machines like this one and like the one Acorn built for the BBC

# Spectrum

In this slot various contributors explore different aspects of the ZX Spectrum

## Topping up characters by redefinition

***Geoff Wilkins** presents a routine to redefine the Spectrum keyboard.*

How many user-defined characters can you create on a Spectrum? The Spectrum manual tells you how to make up to 21 using the user graphics included in the character set codes 144 to 164 But there are far more exciting possibilities using the system variable *Chars* with the help of which you can redefine up to 96 characters — the whole of the keyboard between the space-character and the copyright symbol

What you have to do is 1) copy the data for characters in the Rom into an area of Ram, 2) alter *Chars* so that instead of pointing to the Rom character-set it points to the copy in Ram 3) redefine the data of the Ram set as and how you like

The following program copies the character-set which starts at address 15616 in the Rom, to an area above Ramtop in the Ram starting at address 31744 It then pokes a new value, 123 into address 23607 (the second byte of *Chars*) thus giving *Chars* the value of 31488 (123 times 256) instead of the usual 15360 (60 times 256) — this being 256 less than the beginning of the character set Next the program redefines whichever character key you input, using eight numbers per character precisely as the manual describes redefinition of user graphics

```
10 CLEAR 31743  FOR A=15616 TO 16383  POKE
   A+16128 PEEK A  NEXT A
20 Poke 23607 123
30 CLS  INPUT  CHARACTER-KEY TO BE REDE
   FINED  K$  IF K$<    OR K$> © THEN GO
   TO 30
40 LET P=31744+(CODE K$  32)*8
50 FOR N=0 TO 7  INPUT  BINARY-DATA NUM-
   BER FOR LINE" (N+1) B  POKE P+N B  NEXT
   N
60 PRINT  NEW CHARACTER    K$"  PRESS
   SPACE KEY  TO  REDEFINE     ANOTHER
   CHARACTER, ANY OTHER"   KEY TO BREAK"
70 IF INKEY$<>    THEN GO TO 70
80 PAUSE 0  IF INKEY$     " THEN GO TO 30
90 CLS
```

Try running this inputting capital ' P for the character to be redefined and the numbers 1 3 7 15 31 63 127 255, for the data for the new character s eight lines You will find that capital P has been redefined into a triangular graphic even when it occurs in keywords like *Print* and *Poke* The effect on some keywords after you have redefined a number of capitals can be quite bizarre so you may prefer to stick to lower-case characters but the keywords continue to work as normal whatever their appearance

Anyway you can always return to the normal Rom character-set by the command *Poke* 23607 60 — and *Poke* 23607 123 will take you back again to the new Ram set

You can have a lot of fun just playing around with this program Chapter 14 of the Spectrum manual explains the effect of different numbers on the new character s eight lines You can enter them in the form BIN 01000111 or as decimal-notation numbers

You can use the program to create a new keyboard for say the Greek alphabet including accents and breathings or Punjabi characters or whatever The new character set is easily saved onto tape by

```
SAVE  CHARS  CODE 31744 768
```

and loaded again by

```
CLEAR 31743  LOAD  CHARS  CODE 31744
POKE 23607 123
```

Do not forget every time you run the program from line 10 you will wipe out any newly defined characters by copying the normal Spectrum set back into the Ram again You can avoid this by running from line 20 or 30

***Ant Hurrion** shows you how to play a little night music.*

This little program enables you to use the Spectrum as a synthesiser playing notes as you enter them using keys 0 to 9 Hook your machine up to the amplifier of your Hi-fi and pretend you are Depeche Mode or the Human League

The program first asks you to enter your note length — try starting with 0 05 You can change line 40 to play in different octaves if you wish See you in the Top 10

```
 LIST

  5  REM  SYNTHESISER********ANT HU
      RRION
 10  PRINT 'NOTE LENGTH   . INPUT
      L:CLS
 20  IF INKEY$ = '" THEN  GOTO 20
 30  LET N = (CODEINKEY$) - 48: REM
      N IS THEN MIDDLE C
 40  BEEPL,N + 24: REM  THE NUMBER
      ADDED TO N DETERMINES OUR OC
      TAVE,TRY N+12,N+36,ETC
 50  GOTO 20
```

## New solution for line deletion

*Jeremy Ruston explains how to insert and delete lines on screen.*

Recently I wrote an elementary word-processing program for the BBC computer. Part of the program offered on screen text editing, for which I needed routines to insert and delete characters and lines on the screen. The simplest way to insert and delete characters is to reprint the line on which the change is to be made. However my solution to the problem of inserting and deleting whole lines from the display has considerably wider application.

This program demonstrates the procedures "insert" and "delete" by printing a screenful of coloured letters and then alternately opening up and deleting a line which contains the words "Happy Christmas".

Both procedures are called with three parameters. The first specifies which line of the screen is to be deleted or where a line is to be inserted. The next parameter is one less than the number of lines per screen in the current mode and the last parameter is the number of characters per line in the current mode.

Lines 250 and 260 save the current cursor co-ordinates in X% and Y% so that the cursor can be restored at the end of the operation. Line 270 sets up a text window to stretch from the line that is to be inserted to the bottom of the screen. Line 280 moves the cursor to the top left of this window and line 290 moves the cursor one line up.

Since the cursor is already at the top of the current window, the operating system scrolls the window down, creating a blank line at the point where the insertion is required. Line 300 then destroys the window.

Line 310 increments the cursor's Y co-ordinate to ensure that the cursor is in the correct position in relation to the text on the screen. Line 320 moves the cursor to the required position before line 330 exits the procedure.

PROCdelete operates in the same manner, except that the window is scrolled up, by positioning the cursor on the bottom line of the window and printing a line feed code.

Both these routines may have to be altered to fit your application. For example, it may be better for you to move all the text above a deletion down a line, rather than vice-versa. It is also possible to run all the VDU statements in the routines into one very long statement. If you do not need to restore the cursor to its old position, you could cram each routine into a single line, dispensing with the procedures altogether.

```
LIST
   10 REM -------------------------
   20 REM  Insert and delete line
   30 REM    Copyright (C) 1982
   40 REM       Jeremy Ruston
   50 REM -------------------------
   60 MODE 7
   70 VDU 23;8202;0;0;0;
   80 FOR T%=0 TO 23
   90 VDU 31,0,T%
  100 PRINT CHR$(128+RND(5));STRING$(38,
CHR$(65+T%))
  110 NEXT T%
  120 REPEAT
  130 TIME=0
  140 REPEAT UNTIL TIME>30
  150 PROCinsert(10,39,24)
  160 PRINT TAB(0,10);" Happy Christmas"
  170 TIME=0
  180 REPEAT UNTIL TIME>30
  190 PROCdelete(10,39,24)
  200 UNTIL FALSE
  210 END
  220 REM -------------------------
  230 DEF PROCinsert(L%,R%,B%)
  240 LOCAL X%,Y%
  250 X%=POS
  260 Y%=VPOS
  270 VDU 28,0,B%,R%,L%:REM text window
  280 VDU 30            :REM home cursor
  290 VDU 11            :REM cursor up
  300 VDU 26            :REM no windows
  310 IF Y%>L% THEN Y%=Y%+1
  320 VDU 31,X%,Y%      :REM cursor move
  330 ENDPROC
  340 REM -------------------------
  350 DEF PROCdelete(L%,R%,B%)
  360 LOCAL X%,Y%
  370 X%=POS
  380 Y%=VPOS
  390 VDU 28,0,B%,R%,L%:REM text window
  400 VDU 31,0,B%-L%    :REM cursor move
  410 VDU 10            :REM cursor down
  420 VDU 26            :REM no windows
  430 IF Y%>L% THEN Y%=Y%-1
  440 VDU 31,X%,Y%      :REM cursor move
  450 ENDPROC
  460 REM -------------------------
```

# Machine Code

Ian Stewart and Robin Jones present a new series for beginners

## Plus or minus? That is the question

Now that we've seen something about manipulating binary numbers let's return to looking at the way they are handled inside the machine. Usually a number is held in a fixed number of bits, often 16 or 24 or 32, depending on the machine design. This number of bits is called the *word size* for the machine.

Let's examine what numbers could be held in a 4-bit word.

| 4-bit pattern | Decimal value |
|---|---|
| 0000 | 0 |
| 0001 | 1 |
| 0010 | 2 |
| 0011 | 3 |
| 0100 | 4 |
| 0101 | 5 |
| 0110 | 6 |
| 0111 | 7 |
| 1000 | 8 |
| 1001 | 9 |
| 1010 | 10 |
| 1011 | 11 |
| 1100 | 12 |
| 1101 | 13 |
| 1110 | 14 |
| 1111 | 15 |

It's obvious why bigger word sizes are chosen in practice — a machine which can only represent the numbers 0 to 15 is unlikely to be adequate. But there are two other problems. The notation can't represent fractional values (7.14 for instance) and it can't represent negative numbers.

We'll ignore the fractions problem because most machine code routines only use integers, but the way in which negative numbers are dealt with is more pressing.

The technique is simple. If you've got the binary representation of a positive number and you want to create its negative equivalent you do two things:

1. Change all the 0s to 1s and all the 1s to 0s (this is rather picturesquely called "flipping the bits").
2. Add 1 to the result.

For instance, suppose you want −3

```
3=0011 in a 4-bit word
Flipping the bits gives   1100
Now add 1                   +1
                          1101
```

So 1101 represents −3. It's called the *2's complement* of 0011.

We are not going to explain exactly why this works, but you can prove to yourself that it does in any particular case like this.

If you add 3 to −3 (or 5 to −5 or anything to minus hesif) you shoulc get zero. So

```
    0011     (=3)
  + 1101     (=−3)
  = 10000
     111     (Don't forget that 1+1=0 carry
              1 in binary)
```

So we *don't* get 0000 at all. But the junior 4 bits are zero, and if you are working in a 4 bit word the senior bit will just drop off the end. (For a convenient analogy, think about a car trip-meter with 3 digits — if it reads 999 and you drive an extra mile, it reads 000 and a "1" has "dropped off" the left-hand end.)

In other words we should have seen it like this:

```
   0011
 + 1100
   ----
   0000
 1
```

This always works, provided that the number of bits is fixed throughout. Don't forget to include leading zeroes to make up the number of bits to this standard length, *before* taking the 2's complement.

Let's rewrite the 4-bit table of values now including negatives.

| Decimal | Binary | 2's complement | Decimal |
|---|---|---|---|
| 0 | 0000 | 0000 | 0 |
| 1 | 0001 | 1111 | −1 |
| 2 | 0010 | 1110 | −2 |
| 3 | 0011 | 1101 | −3 |
| 4 | 0100 | 1100 | −4 |
| 5 | 0101 | 1011 | −5 |
| 6 | 0110 | 1010 | −6 |
| 7 | 0111 | 1001 | −7 |
| 8 | 1000 | 1000 | −8 |
| 9 | 1001 | 0111 | −9 |
| 10 | 1010 | 0110 | −10 |
| 11 | 1011 | 0101 | −11 |
| 12 | 1100 | 0100 | −12 |
| 13 | 1101 | 0011 | −13 |
| 14 | 1110 | 0010 | −14 |
| 15 | 1111 | 0001 | −15 |

Straight away you can see that there's a problem. Every bo-pattern occurs twice so that, for instance, 1001 could mean 9 or −7. So we'll have to restrict the range of values still further.

We have drawn a dotted line around the region we actually choose to represent. If you look at the senior (leftmost) bit in each of the patterns you'll notice that it's "0" if the number is positive and "1" if the number is negative. This is obviously a very convenient distinction.

So the range of numbers we can get into a 4-bit word is −8 to +7. For 5 bas it would be −16 to +15. For 6 bits it will be −32 to +31 and so on. A 16 ba word (which is impoltant so far as the Z80 is concerned) holds the range −32768 to +32767.

We have now dealt with positive and negative numbers. Next week we will look at how the machine crunches them. To do this, we need to understand the internal structure of the processor — its *architecture*.

The Z80 processor is the product of some 25 years of computer development and is a fairly sophisticated beast. So it's not really a good place for the beginner to start. What we are going to do, then, is describe a simple processor, just to introduce the important concepts which are relevant to virtually all current devices.

We will suppose that our imaginary machine has a memory of 16-bit words and a number of 16-ba special-purpose registers as shown below.

### Machine Architecture

Let's look at the memory first. In Basic we could have called each of those memory locations anything we fancied, but the naked machine isn't so friendly. It insists on numbering every location in an absolutely fixed way, starting at zero. These numbers are called the *memory address*. We have numbered them in hex, although you should always bear in mind that, ultimately, the coding will be in binary.

**To be continued next week.**

Memory

A-reg — Accumulator
PC — Program counter
SP — Stack pointer
I-reg — Indirection register
X-reg — Index register

000
001
002
003
004
005
006
007
008
009
00A
00B

Memory addresses

Reproduced from *Machine Code and better Basic*, by Ian Stewart and Robin Jones (Price £7.50), by kind permission of Shiva Publishing Ltd, 4 Church Lane, Nantwich, Cheshire CW5 5RQ.

# Peek & poke

**Peek your problems to our address. Ian Beardsmore will poke back an answer.**

## STACKING THE DECKS HIGH

*S Wilkinson of Holcroft Road, Kingswinford, East Midlands writes*

**Q** **I ordered a ZX Spectrum about six weeks ago. While I am waiting, I would like to try writing a program, or at least re-write a program, for it. I want to do D K Allen's pontoon program, but I have a problem. Could you please give me the configuration for Hearts, Clubs, Diamonds and Spades. Please put them in binary form.**

**A** This in fact is simple to do. All you need is an 8 × 8 grid. A nought is used for the spaces and a one for the shaded areas. I have given their decimal numbers as well.

| (Hearts) | | (Clubs) | |
|---|---|---|---|
| 00100010 | 34 | 00001000 | 8 |
| 01110111 | 119 | 00011100 | 28 |
| 01111111 | 127 | 00101010 | 42 |
| 01111111 | 127 | 01111111 | 127 |
| 00111110 | 62 | 00101010 | 42 |
| 00011100 | 28 | 00001000 | 8 |
| 00001000 | 8 | 00011100 | 28 |
| 00000000 | 0 | 00000000 | 0 |

| (Diamonds) | | (Spades) | |
|---|---|---|---|
| 00001000 | 8 | 00001000 | 8 |
| 00011100 | 28 | 00011100 | 28 |
| 00111110 | 62 | 00111110 | 62 |
| 01111111 | 127 | 01111111 | 127 |
| 00111110 | 62 | 00111110 | 62 |
| 00011100 | 27 | 00001000 | 8 |
| 00001000 | 8 | 00011100 | 28 |
| 00000000 | 0 | 00000000 | 0 |

Throughout the program I have kept the first column and the last line, at nought. This is to give space between characters on the screen.

## RAISING HIGH THE ROOFBEAM

*M Elliek of 3 Burrington Close, Nailsea, Bristol, Avon, writes*

**Q** **On several occasions your magazine has printed letters from readers complaining of long delivery times. What about yourselves?**

**On July 7 I sent a query to Peek & poke asking if the new Microdrive to be released by Sinclair would be usable with the ZX81. I put in a SAE for reply and as yet have had none. Even a "don't know" would be better than nothing.**

**A** As I have said before, I cannot answer every letter personally. There are simply too many of them.

Instead, I try and pick letters that reflect questions asked by a number of different readers. Your letter, which appeared in Peek & poke September 9, was similar to a number of other letters I received on the same subject. Rather than answer each letter individually, I picked one to stand for the rest.

There are two reasons for a delay in publishing letters. One is lack of space. The other is the time needed to research each query.

## A PRINTER'S PRICE

*Richard Jones of Avon Crescent, Pelsall, Walsall, writes*

**Q** **Could you please tell me how a ZX printer can be used with a Vic20 computer? Also could you give me a rough idea of how much it will cost. I have seen the July 1 issue of *Popular Computing Weekly* and I saw the Amber 2400 printer advertised. Could you tell me which would be more suited to the Vic?**

**A** Several people have asked this, and though I have mentioned it before, a repeat will probably be useful for some readers. The company you want is Microtanic Software' of 235 Friern Road, Dulwich, London SE22. They do interfaces for several computers, including the Vic, BBC, AIM65 and Atom.

The printerface costs £29.95 plus 50p postage and packing. You will, of course, have to buy a ZX printer. With postage and packing you are talking of a little under £95.

The address of Amber was given in that same issue of *PCW* but if you missed it here it is again: Amber Controls, Central Way, Walworth Industrial Estate, Andover, Hants.

As to which of the two is more suited to the Vic, it is more a question of which is more suited to your pocket and your taste. The Amber will be about £20 cheaper. The paper is a standard product, unlike Sinclair's which is only available from one independent source. However I doubt if the inked ribbon for the Amber will be available from an independent source.

From my post bag there seem to be a few problems with the Sinclair printer, particularly with very light printing. The size of the printout on the Amber is smaller, but as long as you keep a good inking ribbon in, it will probably be clearer.

## LAWING NOT ALLOWED

*Ian Morrison of Pentydwr, Three Crosses, Swansea writes*

**Q** **Please could you answer some queries for me about the law on software copyright. I am thinking of starting a software library for the ZX81. I have a store of 500 programs, about 50 of which were written by myself. Could you please tell me how the law stands on *lending* cassettes, where**

**A) Software is on the original cassette.**

**B) Software is not on the original cassette.**

**C) Software is copied from a book.**

**D) Software is copied from a magazine.**

**Could you tell me if it is illegal to sell programs taken from listings in magazines, if you credit the magazine concerned?**

**I am also hoping to start a service whereby people send in programs to a software pool. If a program is accepted, the author will be given access to other programs in the pool. This may sound a little ambitious, but I feel that there is not enough exchange of information between computer enthusiasts.**

**A** These questions do not just concern the ZX81. They concern the whole software business. Now that a recent government green paper has passed the buck back into the lap of the computer industry, it is a situation that we must sort out for ourselves, and the sooner the better.

I must point out at the start that I am not a lawyer. I will attempt to give a guide to the law as it stands at the moment, but I must stress that this is just a guide.

A lot depends on whether a software cassette is regarded as a music or video tape. The Mechanical Copyright Protection Society told me that it is not illegal to use music cassettes in a library, providing you use the original tapes. But, the Video Copyright Protection Society told me that it is illegal to use a video tape for hire, without the manufacturer's consent.

David Paterson of Silversoft said in an interview in *Popular Computing Weekly*, September 2, that there was not much that could be done about cassette libraries. I have spoken to him since then, and he told me that he was not aware of the law concerning video cassettes. The crucial question is whether software is to be regarded as music or video. Unfortunately, the courts have yet to rule on this point.

The second two points that you raise are more easily covered. Look at the front of any book and you will most likely see the following:

'All rights reserved. No part of this publication may be reproduced, stored in any retrieval system or transmitted in any form or by any means, electronic, mechanical, or photocopying without prior permission of the copyright owner.'

Strictly speaking, this means that you are not allowed to store computer programs found in a book on a computer. This will not apply to tapes made for your own use, but it does mean that you cannot use these programs in a library without permission; this also applies to magazines.

If you feel that you want to go ahead with your library, you should start by approaching the software manufacturers. They might agree to some sort of royalty deal, but I doubt if they would let you reproduce their programs for free.

Perhaps you might try contacting one of the other libraries that has grown up. One was apparently represented at the recent Microfair, though most people I talked to did not seem to have noticed it.

Whatever happens in the next few months will need to be watched very carefully, as it will effect everyone who sells or buys software, especially games software.

*Send your questions to Peek & poke, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF*

# Classified

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**BBC MODEL B,** unused £388 Telephone Mr G. A Quick 0428 723636

**UK101** — 8K Ram and Mono 2 uprated PSU and tape deck unboxed £100 ono Tel (04262) 3301

**ZX81** 16K plus software magazines and books £80 Phone after 7 pm 01-456 8372.

**UK101** — 17K Ram and power supply metal case with software £200 ono Phone Harlow 26383 Mr Gill

**16K VIC20** for sale £200 Tel Ipswich 715084




**Solution to Puzzle No 20**

In the first of the Ancient Algorithms the caveperson has been calculating the highest common factor (or as one entrant had it — highest cairn factor) of the number of stones in the original heaps via an iterative loop. In Basic the process would be represented by:

```
10 INPUT A, B
20 IF A > B THEN A = A - B ELSE B = B + A
30 IF A * B > 0 THEN 20
40 PRINT A + B
```

This algorithm is known as a Euclidean algorithm for greatest common divisor by repeated subtraction. No prizes to the entrant who solved the puzzle using a packet of Opal Fruits!

**Winner of Puzzle No 20**

The winners are Heather and Michael Devine, 12 Greenhaven Rise, Llandough, Penarth, S Glamorgan, who receive £10.

**Rules**

The winner of the puzzle will be the reader who, in the opinion of *Popular Computing Weekly*, has submitted the best solution. Preference will be given to solutions which show how the entrant arrived at the correct answer. Envelopes containing entries should be clearly marked 'PUZZLE'. The closing date for the competition is Tuesday October 5. The judges decision is final.

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